

## CLAIMS

1. A pressurized water pressure-reducing nozzle for generating microbubbles in a flotation plant comprising  
5 a first pressure reduction stage (1), an intermediate transfer chamber (3), a second pressure reduction stage (2) and an outlet pipe (4), this nozzle being characterized in that:

- the first and second pressure reduction stages  
10 are produced in the form of a diaphragm comprising one or more orifices, the hydraulic diameter ( $d_1$ ) of the orifice of the first stage (1), or of the equivalent orifice if this stage comprises several orifices, being greater than the diameter ( $d_2$ ) of the orifice of the  
15 second stage, or of the equivalent orifice if this stage comprises several of them, the aforementioned orifices being able to be of any shape, but preferably circular,

and in that:

20 - the first pressure reduction stage (1) performs a preliminary pressure reduction by absorbing 5 to 20% of the available pressure;

- the second pressure reduction stage (2), in which most of the pressure reduction occurs, causes the  
25 pressurized water to pass from saturation pressure to the nozzle outlet pressure;

- the intermediate chamber (3) is a transition chamber in which the pressurized water approaches saturation pressure by absorbing 5 to 30% of the  
30 available pressure and

- the outlet pipe (4) consists of a sudden pressure reduction and cavitation confinement pipe, whose minimum length ( $L$ ) substantially corresponds to the distance separating the end of said pipe on the  
35 second pressure reduction stage side from the point of reattachment of the jets onto the walls of the pipe, with an angle of divergence ( $\alpha$ ) of the jets, before

reattachment, between 3 and 12°, preferably between 6 and 9°.

2. The nozzle as claimed in claim 1, characterized in  
5 that the orifice of the first pressure reduction stage consists of a valve, a baffle or any other flow restriction device.

3. The nozzle as claimed in claim 1, characterized in  
10 that the intermediate or transition chamber (3) has a height (e), i.e. a distance separating the first pressure reduction stage (1) from the second stage (2), which is less than the diameter (d1) of the orifice of the diaphragm forming the first pressure reduction  
15 stage, preferably equal to half this diameter.

4. The nozzle as claimed in claim 1, characterized in  
that the diaphragm forming the second stage comprises a  
20 single central orifice.

5. The nozzle as claimed in claim 1, characterized in  
that the diaphragm forming the second stage comprises a  
plurality of orifices situated at an equal distance  
from the center of the diaphragm.  
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6. The nozzle as claimed in any one of claims 1 to 5,  
characterized in that the hydraulic diameter (d1) of  
the orifice of the first pressure reduction stage (1)  
or of the equivalent orifice if this stage comprises  
30 several orifices, is between 1.6 and 1.1 times the  
diameter of the orifice of the second pressure  
reduction stage or of the equivalent orifice if this  
stage comprises several orifices.

7. The nozzle as claimed in any one of the previous  
35 claims, characterized in that the second pressure  
reduction stage (2) has sudden widening, the outlet

angle of the orifice or orifices of the diaphragm forming it being level ( $180^\circ$ ) or between  $90^\circ$  and  $270^\circ$ .

8. The nozzle as claimed in claim 1, characterized in  
5 that the outlet pipe (4) terminates in a trumpet-shaped end divergent (5).